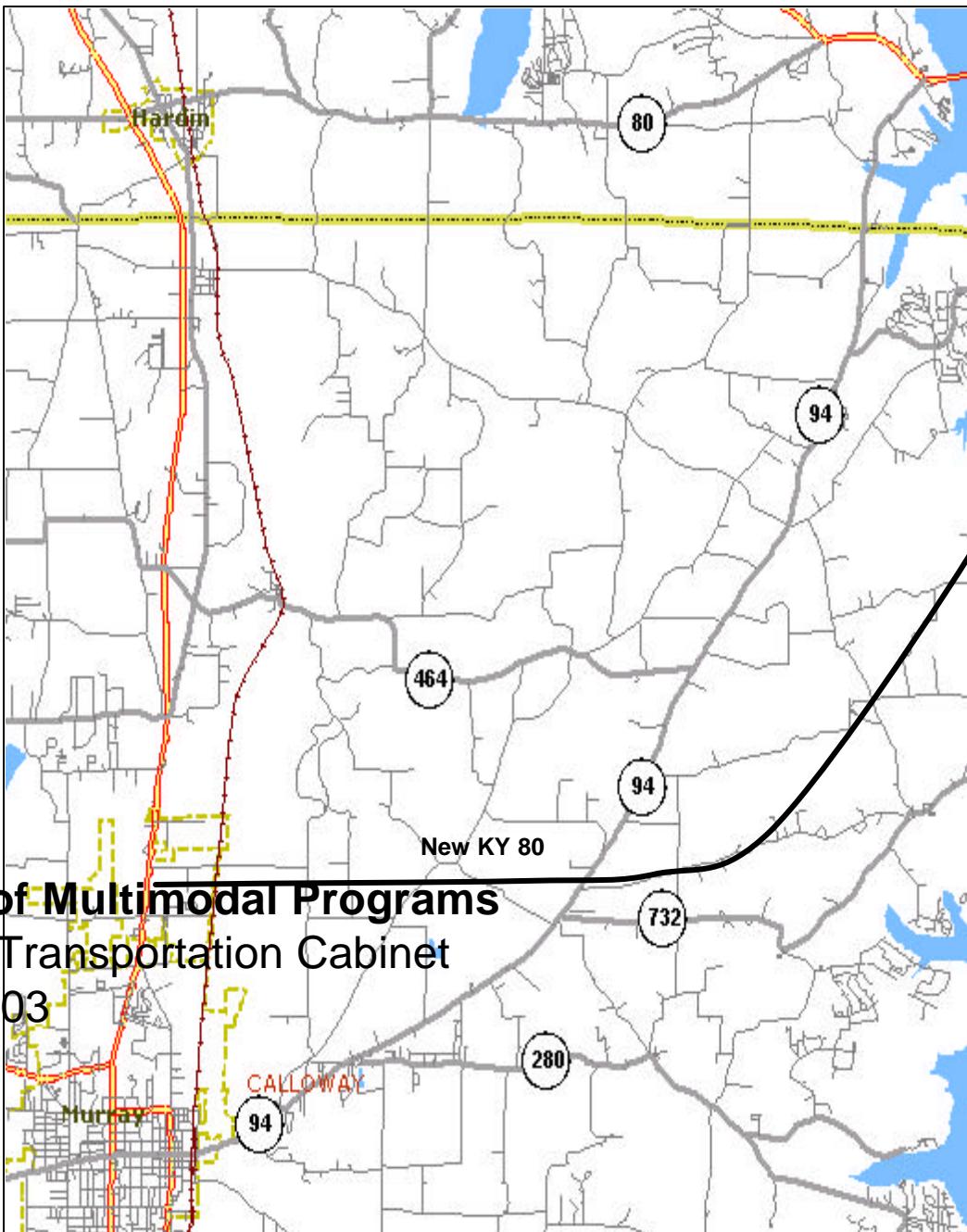


# TRAFFIC FORECASTING REPORT 2003



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## I. Introduction

This is the fourth edition of the annual *Traffic Forecasting Report*. The 2003 *TFR* contains the latest (predominantly 2002) forecasting/modeling data as follows:

- ATR locations, k-factors, and ADTs
- Functional class average k-factors and d-factors
- Functional class average vehicle types
- Vehicle miles traveled statewide totals by functional class
- Kentucky population projections by county
- List of small urban models
- List of urbanized models
- Kentucky Statewide Model Summary
- List of county-level models
- Maps of ATRs and index stations: Statewide, Northern Kentucky, Louisville, and Greater Fayette County
- List of index station locations and ADTs
- Glossary/Acronyms

New reports include:

- Monthly Volume Count Factors
- Hourly Volume Percentage by Functional Class
- Average Speeds for Nonattainment Areas

## **II. Traffic Forecasting Process Update**

### **A. Background**

Information on the traffic forecasting process can be found on the web at [http://www.kytc.state.ky.us/Multimodal/TRAFFIC\\_FORECASTING.htm](http://www.kytc.state.ky.us/Multimodal/TRAFFIC_FORECASTING.htm). The *TFR* serves to update new data and processes used in traffic forecasting.

### **B. Process Improvement**

Several mechanisms are used to improve the forecasting process including the KYTMUG, research studies, and the web page. The traffic forecasting area is always evolving in response to new customers and the ever-changing world in which we live.

#### **1. Kentucky Traffic Model Users Group**

The Traffic Model Users Group is a forum that discusses current forecasting issues and shares information. The Traffic Model Users Group (MUG) consists of Cabinet forecasters/modelers, MPO modelers, consultant partners, research partners (Kentucky Transportation Center and the University of Kentucky), the Federal Highway Administration, and interested Cabinet decision-makers.

The MUG meets as needed and has sponsored several workshops. Table 2 is a list of MUG meetings and speakers over the past eight years

#### **2. Research Studies**

KYTC has initiated several research studies in an effort to continuously improve the art of traffic forecasting. Recent research studies conducted by the Kentucky Transportation Center (KTC) in the forecasting area include:

- **Analysis of Vehicle Classification Data** - KTC has developed a vehicle classification viewer that can be accessed on the web page.
- **Development of Load Spectra for Use in Pavement Design** - This research study will use the recommendations of the American Association of State Highway and Transportation Officials (AASHTO) 2002 Pavement Design Guide and will allow KYTC to use load spectra rather than the familiar equivalent axle loads.
- **Traffic Growth Rate Analysis** - This research study developed new means of

estimating vehicle miles traveled (VMT), especially on local roads. Also developed were new ways of forecasting VMT into the future. The study can be found at <http://www.ktc.uky.edu/Reports%20Published%20Recently.htm>.

- **Index Stations** - This research study is developing a means of optimizing counting on interstates and high-volume national highway system roads. It will allow some sections of highways to be estimated routinely from adjacent locations (index stations) where the data is more reliable.
- **Superpave ESAL Program** – This program can be used to calculate quick response ESAL estimates at adequate accuracy for superpave mix design.
- **Speed Estimation** – This study will produce average highway speeds on all state maintained roads using the HERS equations.

### **III. Traffic Forecasting Data Sources Update**

Traffic forecasting is a very data intensive process. This section covers traffic forecasting data sources, including traffic monitoring data, socioeconomic data, trip data, and HPMS data.

#### **A. Traffic Monitoring Data**

Traffic monitoring system changes include new data for the ATRs and index stations. Exhibits 1A, 1B, 1C, and 1D show the locations of the ATRs and index stations that are in the major urban areas and the statewide. Table 3 lists the ATRs and gives important data such as K-factors and average daily traffic.

Functional class averages derived from the ATRs and other traffic monitoring stations are located in the following tables:

- Table 4A – Functional Class Average K-factors and Average Daily Traffic
- Table 4B – Functional Class Average Growth Rates
- Table 4C – Aggregate Class ESAL Defaults
- Table 4D – Functional Classes and Aggregate Classes
- Table 4E – Travel Activity by Vehicle Type
- Table 4F – Truck Percentage and Axle Factor Averages
- Table 4G – Monthly Volume Count Factors
- Table 4H – Hourly Volume Percentage

The Division of Planning provides access to count maps and a historical count database on their web site (<http://www.kytc.state.ky.us/planning/index.htm>). The web site contains traffic count maps, which portray count data at locations in every county and in most cities. It also contains the CTS computer program, which contains historical data and current year estimates at more than 20,000 count locations in Kentucky.

#### **B. Other Data**

While traffic monitoring data is the most important source of data for traffic forecasts, other data is also needed. Some of the other data inputs into traffic forecasting include socioeconomic data, trip data, land use data, highway data and Highway Performance Monitoring System (HPMS) data.

## **1. Socioeconomic Data**

Population data has been made available by the 2000 decennial census. The new census data for each Kentucky county along with 1990 population data and projections for 2005, 2010, 2015, 2020, 2025, and 2030 are shown in Tables 5 and in Exhibit 2. The projections were made by the state demographer--the University of Louisville Urban Study Center (see Table 6 for socioeconomic data providers).

## **2. Travel Data**

Travel data consists of information derived from travel diaries, origin-destination surveys, census data, and other specialized data sources. Table 6 lists travel data sources, the type of data, and the web address if available.

The Transportation Cabinet has purchased some data add-ons from the Bureau of Transportation Statistic's National Personal Transportation Survey (NPTS). The NPTS nationwide survey is made every five years and contains information about tripmaking for almost every conceivable stratification including income, rural/urban, race, gender, and many other categories. The add-on surveys provide Kentucky-specific data for use in traffic modeling. Add-on surveys were made in Carter, Edmonson, Pulaski, and Scott county. The survey data will be analyzed as a part of the ongoing statewide model contract.

Census Transportation Planning Package (CTPP) data is expected to be available very soon. This includes the valuable journey-to-work data.

## **3. HPMS Data**

Vehicle miles traveled (VMT) is one key product of HPMS that is related to traffic forecasting. The research study mentioned in part II resulted in revisions to how local road VMT are calculated along with some modifications to future VMT estimation. Table 7 gives statewide VMT submitted to the HPMS system from 1993 to 2002.

## **4. Speed Data**

Average highway speeds are needed for air quality conformity analysis and for mobility analysis. Table 12 gives average speeds for the nonattainment counties and the source of the data.

## **IV. Traffic Demand Model Update**

The most complex tools used by traffic forecasters are computerized traffic demand models. Listed below are the types of models and other traffic model information.

### **A. Model Types**

- Small Urban Models
- County Models
- Kentucky Statewide Model
- MPO Models
- Other Models

#### **1. Small Urban Area Models**

The Cabinet develops small urban area models for use in urban area studies, special needs studies and traffic forecasts. Table 8 lists all of the small urban areas and the status of modeling in each area. A recent small urban area model completed by the Cabinet is Madison County. Mason County is currently in progress. A GISDK interface was developed for existing models in Hopkins County and Paducah. Top priorities for new SUA models are Georgetown, Danville, and Middlesboro. See web at <http://www.kytc.state.ky.us/Multimodal/SUA.htm> for Small Urban Area information.

#### **2. County-level Models**

KYTC started a new modeling endeavor recently to respond to air quality conformity issues. The Cabinet is producing county-level models for counties that are expected to be non-attainment areas. Table 9 lists the county-level models developed thus far. A county-level model is currently under development in Simpson County.

#### **3. Kentucky Statewide Traffic Model Update**

The Kentucky Transportation Cabinet has used a statewide traffic model (KYSTM) for many years. Table 10 gives a history of major updates along with model specifications. The TAZ and networks can be found on the web at [http://www.kytc.state.ky.us/Multimodal/TRAFFIC\\_FORECASTING.htm](http://www.kytc.state.ky.us/Multimodal/TRAFFIC_FORECASTING.htm). A major KYSTM update is currently underway.

#### **4. MPO Models**

Each Metropolitan Planning Organization (MPO) is responsible for its own models. KYTC provides technical support as needed. Recent major model activities include:

- New Ashland model developed in TransCAD
- Lexington model developed in TransCAD (ongoing)
- Greater Bowling Green model developed for I-66 that may be usable for the new MPO

## **B. Other Traffic Demand Model Information**

### **1. Model Updates**

KYTC's recent models have been developed by the following methods:

- Statewide Modeling Contract (currently four consultants)
- Small Urban Area updates
- Traffic Forecasting projects

### **2. Simulation Models**

There is considerable overlap between traffic demand models and traffic simulation models. Simulation models have been developed for forecasting projects at Northern Kentucky University and in the Mammoth Street Corridor in Newport. The Division of Traffic coordinates simulation modeling activities for the Cabinet.

### **3. Model Documentation and Innovations**

The Division of Multimodal Programs is in the process of developing a Traffic Demand Model Guide. This report will contain model standards, model inventories, and will serve as a repository of the latest model innovations.

## GLOSSARY AND ACRONYMS

### Glossary

**Automated Traffic Recorder (ATR)** – ATRs record traffic data continuously (365 days/yr.). They are used as source data for k-factors and d-factors.

**Average Daily Traffic (ADT)** – ADT is the average traffic volume going past a point in one day. It is interchangeable with Annual Average Daily Traffic (AADT).

**Design Hour Volume (DHV)** – DHV is a volume unit based on the 30<sup>th</sup> highest hourly volume on a road in a year. It is commonly used for highway capacity analysis.

**Directional Factor (D-Factor)** – D-Factors are measures of the peak hour directionality on two-lane highways. They are based on the average of the 10<sup>th</sup> through 50<sup>th</sup> hours in the year.

**Equivalent Single Axleload (ESAL)** – ESALs are measures of pavement damage and are used in pavement design.

**Index Stations** – These are locators where traffic volume is collected for one week annually. The frequency and accuracy of their counts allow index stations to be used to factor adjacent interstate locations.

**K-Factor** - This factor is based on the 30<sup>th</sup> highest hour of the year and is used to compute DHVs.

**Metropolitan Planning Organization (MPO)** – MPOs are the planning authority in areas populations over 50,000.

**Milepoint** – The milepoints used in this report describe the locations of ATRs and index stations, based on the midpoint of a highway section between two exits.

**Urban Areas** – These areas are cities with a population of 5,000 to 49,999. Roads in these areas have urban classifications.

**Urbanized Areas** – These areas are cities with a population greater than 50,000.

**Vehicle Miles Traveled (VMT)** – VMTs are the common unit of measure of travel for an area (e.g. county). One VMT is the equivalent of one vehicle traveling one mile.

### Acronyms

**HPMS** – Highway Performance Modeling System

**KTC** - Kentucky Transportation Center

**KYSTM** - Kentucky Statewide Traffic Model

**KYTC** - Kentucky Transportation Cabinet

**MUG** – Traffic Model Users Group

**NPTS** - National Personal Transportation Survey

**TAZ** - Traffic Analysis Zone

**TABLE 1**  
**Traffic Forecasting Products and Customers**

Data Products	Forecast Year	Customers					
		Design	Planning	Air Quality	Materials	HPMS	Traffic
ESALs	10yr/20yr/40yr	X			X		
ADTs	Current, Construction, Design, Air Quality	X	X	X	X	X	X
DHVs	Current, Construction, Design, Air Quality	X	X	X			X
Truck Percentages	Current, Construction, Design, Air Quality	X	X	X		X	
Measures of Effectiveness (VMT, VHT)	Current, Construction, Design, Air Quality		X	X			
Speed Estimation	Air Quality		X	X			

**NOTES**

1. Data products come in various formats including maps, worksheets, intersection turning movement diagrams, summary computer files, and reports.
2. Specialized forecasting data products include select link analysis, networks, and zone maps.
3. Typical forecasting scenarios are build, no build, and residual traffic.

**TABLE 2**  
**Kentucky Traffic Model Users Group Meeting Summary**

Date	Presentation	Presenter	Organization
07/22/2003	Simpson County Model	Scott Walker	Wilbur Smith
	Lexington Model	Kyeil Kim	Bernardin, Lochmueller & Associates
	Madison County Model	Diane Zimmerman	Jordan, Jones & Goulding
	Mobile6 Parameter Update	Jesse Mayes	KYTC
	Purpose of Meeting & History/Use of Ky. Statewide Model	Rob Bostrom	KYTC
	Update on Current Activities: Network and TransCAD	Tom Cooney	Wilbur Smith
	KySTM Brainstorming (Draft Wishlist of Model Objectives)	Marc Williams	Wilbur Smith
	Statewide Model State of Practice	Tom Cooney	Wilbur Smith
		Mark Byram	Ohio DOT
		Vince Bernardin	Bernardin, Lochmueller & Associates
		Steve Smith	Indiana DOT
04/22/2003	Purposes of Data Collection, Sample Travel Diary & Survey Types	Elaine Murakami	FHWA
	Survey Process		
	Household Travel Surveys		
	KIPDA's Household Survey	Randy Simon	KIPDA
	Kentucky's NHTS Add-On Surveys	Ben Pierce	Battelle
01/28/2003 - 01/30/2003	Geocoding & GPS	Elaine Murakami & Ben Pierce	FHWA & Battelle
12/06/2002	TransCAD Workshop	Paul Ricotta	Caliper
	Summary of Speed Requirements for MOBILE6	Jesse Mayes	KYTC
	Review of Atlanta Speed Study	Andrew Smith	WSA
	TMIP Review	Rob Bostrom	KYTC
10/25/2002	Review of Current Methodology for Determining Speeds from Transportation Demand Models		KIPDA, OKI, BLA, Corradino, WSA
	Madison Model TransCAD GISDK Script	Marc Williams	Wilbur Smith Associates
	Kentucky Statewide Model Combined Zones		
	KY 22/ Old Henry Road/ Crestwood Connector Subarea Model	Nick Uhren	Jordan, Jones & Goulding
08/14/2002	Lexington Regional Model	Vince Bernardin	Bernardin, Lochmueller & Associates
	Ashland Regional Model	Ken Kaltenbach	The Corradino Group
04/04/2002	Seminar on Speed Estimation for Planning Purposes	Rich Margiotta	Cambridge Systematics
	Transearch Database	Joe Bryan	Reebie Associates
	North-South Initiative (Cincinnati to Dayton) Freight Model	John Gliebe	PB Consult
01/07/2002 - 01/09/2002	Freight Analysis Framework	Mohammed Alam	Battelle
	Critical Issues Facing Freight Data Collection	Fawn Thompson	FHWA Southern Resource Center
10/18/2001	Workshop on Statewide Travel Forecasting	Alan Horowitz	University of Wisconsin - Milwaukee
		Bob Gorman	Federal Highway Administration
	New Traffic Simulation Product from Caliper	Paul Ricotta	Caliper
	TRANSIMS: Microsimulation Package	Larry Rilett	Texas A&M
	TRANSIMS: Software Development Update	Naveem Lamba	Price Waterhouse Cooper
	Integrated Model	David Schmitt	Burgess & Niple
		Paul Dorothy	Burgess & Niple
	Simulation Case Studies	Karen Mohammadi	HNTB
		Brian Aldridge	HNTB
07/27/2001	Comparison of Industry Traffic Simulation Packages	Marc Williams	WSA
	KYTC Usage of Traffic Simulation	Dawn Jones	KYTC
	Traffic Simulation Usage Roundtable	David Smith	Presnell
05/17/2001	Summary of KYTC Air Quality Activities and How They Relate to Traffic Modeling	Jesse Mayes	KYTC
	Air Quality Interface to Owensboro Model	Ken Kaltenbach	Corradino Group
	Impact of Parameter Adjustments to Air Quality Models	Paul Lederer	University of Louisville
	Traffic Growth Rates Research for VMT Estimation/Prediction	Barry House	KYTC
02/15/2001	Socioeconomic Data Collection & Use in Kentucky's Traffic Models	Joe Barkevich	Wilbur Smith
	Population Estimating and Growth Trends in Kentucky	Ron Crouch	Kentucky State Data Center
	Economic Data Inputs into Transportation Planning	Eric Thompson	University of Kentucky
	Studies and Traffic Models in Kentucky		
10/17/2000	County Level Modeling Using TransCAD	Marc Williams	Wilbur Smith
		Alan Davis	Wilbur Smith
	Consolidated Travel Demand Modeling System for OKI and MVRPC	Rosella Picado	Parsons, Brinckerhoff, Quade & Douglas
	Innovative Modeling Technologies	Charlie Crevo	Louis Berger & Associates
	Freight Modeling Data: TransSearch Applications in Ky.	Lisa Aultman-Hall	University of Kentucky
	KYTC's GIS and HIS Using Arcview & EXOR	Bill Jones	KYTC
		Greg Witt	KYTC
	TransCAD Network Data	Carroll Collins	Kimley-Horn
	Viper Network Data and Manipulations	David Schmidt	Burgess & Niple

**TABLE 2**  
**Kentucky Traffic Model Users Group Meeting Summary**

	Census Data	Ed Christopher	Bureau of Transportation Statistics
	NPTS Usage and ITS Traffic Data	Patricia Hu	Oak Ridge National Lab
	Traffic Survey Data: Origin-Destination & Household Surveys	Mark Byram	Ohio DOT
	Traffic Monitoring Data Issues	Clark Graves	Kentucky Transportation Center
		Rob Bostrom	KYTC
07/14/2000	TRANSIMS Overview	Kim Fisher	TMIP
04/17/2000	Florida Land Use Allocation Model Discussion of Kentucky L.U. Allocation Practice Discussion of MUG Organizational Issues	Mike Brown	Trans. Planning Services, Inc.
02/16/2000	TransCAD Model Conversion KY Statewide Model Update Mobile 6.0 Air Quality Issues	Rob Bostrom Marc Williams Tom Creasey Lynn Soporowski Charles Schaub Randy Simon Brent Sweger	KYTC Wilbur Smith Jordan, Jones & Goulding KYTC KYTC Louisville MPO Ky FHWA
07/16/1999	Use of Demand Model Network to Create a Traffic Simulation Model The Density Saturation Gradient L.U. Model Using GIS in Travel Demand Models w/ Application of the Indianapolis Model Get Prepared for the 2000 CTPP	Tom Creasey Max Convers Sunil Saha Derek Hungness	Jordan, Jones & Goulding Lexington MPO The Corradino Group HNTB
03/17/1999	TransCAD Software Demonstration Discussion of Traffic Model Alternatives	Howard Slavin Andres Requeros	Caliper Inc. Caliper Inc. Roundtable
11/17/1998	External Trip Synthesizing Ky. Small Urban Modeling Practice Roundtable Discussion on model updates of MPO models, small urban models, statewide model and freight model	Vince Bernardin Diane Zimmerman	Bernardin, Lochmueller & Ass. Zimmerman, Grider & Ass.
05/06/1998	Viper Software Presentation TP+ Software Presentation Discussion of Traffic Model Alternatives	Victor Siu Larry Seiders	Urban Analysis Group Urban Analysis Group
01/21/1998	Introduction to Transportation Conformity MPO Discussion: Modeling for Conformity Modeling Software Discussion	Charles Schaub	KYTC
07/18/1997	Kentucky Statewide Traffic Model Study Switching to Life Style Models of Trip Generation	Tom Cooney Sunil Saha	Wilbur Smith The Corradino Group
02/05/1997	Traffic Model Availability (Who owns the data?) Improving Travel Survey Methods Research Project (GPS O-D) Ohio-Kentucky-Indiana Travel Model Study Area Household Survey	Barry House David Wagner Cheng I Tsai	KYTC Battelle Cincinnati MPO
07/17/1996	Statewide Traffic Model Update Report on Traffic Model Briefing to Secretary of KYTC Nodal Modeling Using TMODEL2 Traffic Model Calibration, Assignment Post- Processing and O-D Simulation	Rob Bostrom Charles Schaub Bob Hazlett Vince Bernardin	KYTC KYTC Bernardin, Lochmueller Bernardin, Lochmueller
03/20/1996	Statewide Traffic Model Update TMIP Overview Northern Kentucky O-D Survey Status Report	Tom Cooney Charles Schaub Cheng I Tsai	Wilbur Smith KYTC Cincinnati MPO
11/17/1995	Usage of Traffic Data by Designers TMIP Overview	John Sacksteder Charles Schaub	KYTC KYTC
09/13/1995	Louisville MPO External Station O-D Survey Cincinnati MPO Traffic Model Update Maptitude Report	Harold Tull Cheng I Tsai Rob Bostrom	Louisville MPO Cincinnati MPO KYTC
07/12/1995	New Developments in MINUTP and TRANPLAN Scope of Users Group Discussion	Ken Kaltenbach	The Corradino Group

**TABLE 3A**  
**2002 Automatic Traffic Recorder Locations and Traffic Data Parameters**

ATR #	County	Route	Milepoint	K Factor	FC	2002 ADT
1	Franklin	US 60	0	14.6%	6	3,629
2	Jefferson	FS 8720	1.57	11.9%	17	3,547
3	Franklin	Collins Lane	0.4	13.2%	17	4,983
4	McCracken	CS 1132	0.6	15.2%	17	2,938
6	Wolfe	KY 15	11.68	16.4%	7	1,150
7	Hardin	US 31 W	29.589	10.3%	14	18,583
8	Grayson	US 62	12.096	N/A	7	2,234
10	Graves	US 45	6.2	N/A	7	1,604
12	Pike	US 23	38.14	9.8%	2	22,294
13	Carter	US 60	20.029	10.6%	7	3,028
14	Jefferson	KY 1142	1.4	9.5%	16	12,593
15	Union	US 60	4.188	12.9%	6	3,103
16	Grant	US 25	17.464	10.7%	7	6,612
17	Daviess	US 60	6.083	10.3%	12	17,048
18	Harlan	US 119	10.026	9.9%	2	10,142
19	Shelby	KY 2861	0	N/A	8	1,136
20	Clark	TR 9000	1.33	10.4%	2	12,641
21	Jefferson	US 31 E	14.635	8.5%	14	21,501
22	Shelby	I-64	36	10.3%	1	39,224
23	Grant	I-75	164.193	16.1%	1	41,200
24	Marion	US 68	10.69	11.2%	16	10,453
25	Mercer	US 127	2.236	10.7%	2	15,895
26	Bourbon	US 68	4.183	10.7%	2	8,197
27	Pendleton	US 27	5.731	10.1%	6	3,875
28	Trimble	US 42	10.049	10.6%	7	1,970
29	Menifee	US 460	4.955	10.3%	6	3,547
30	Estill	KY 52	19.081	N/A	7	1,346
31	Bell	US 25 E	19.035	9.9%	2	10,874
32	Pulaski	US 27	5.734	9.8%	2	7,257
33	Russell	US 127	6.429	14.8%	2	2,424
34	Adair	KY 80	20.058	11.1%	7	3,719
35	Hancock	US 60	12.578	12.3%	2	4,502
36	Ohio	KY 54	9.558	N/A	7	1,117
37	Butler	US 231	16.086	10.7%	7	2,486
38	Logan	US 68	2.574	11.5%	2	3,522
39	Marshall	US 641	18.236	13.1%	6	4,719
40	Muhlenberg	WK 9001	57.1	11.7%	2	8,518
41	Elliott	KY 7	11.373	11.3%	6	3,139
42	Boyd	US 23	0.1	11.9%	2	10,753
43	Floyd	KY 1428	4.185	10.4%	8	2,654
45	Warren	US 231	1.4	9.7%	16	13,056
47	Carter	I-64	170.857	10.4%	1	15,709
48	Henry	I-71	34.56	9.7%	1	26,442
49	Kenton	KY 371	3.17	9.3%	17	33,347
50	Hardin	I-65	89.178	12.1%	1	35,350
51	Lyon	I-24	37.3	11.3%	1	24,435
52	Lewis	KY 546	15.1	9.8%	2	58,657
53	Woodford	BG 9002	69.608	10.8%	2	17,084
54	Nelson	BG 9002	37.6	13.1%	2	9,577
55	Owen	US 127	4.1	13.1%	6	3,438

**TABLE 3A**  
**2002 Automatic Traffic Recorder Locations and Traffic Data Parameters**

<b>ATR #</b>	<b>County</b>	<b>Route</b>	<b>Milepoint</b>	<b>K Factor</b>	<b>FC</b>	<b>2002 ADT</b>
56	Floyd	KY 114	11	12.3%	2	11,787
58	Henderson	US 41	18.6	10.6%	14	36,887
60	Woodford	US 60	0.2	11.9%	2	14,733
63	Boone	I-75	176.1	9.9%	11	101,292
65	Jessamine	US 27	1.6	9.3%	2	20,707
66	Boyle	US 127	1.5	10.4%	14	22,177
70	Pike	US 119	2.3	10.2%	2	11,794
71	Barren	TR 9008	9.2	10.2%	12	6,585
72	Bullitt	I-65	106.5	5.8%	1	49,316
73	Owsley	KY 11	13.3	11.3%	7	4,655
74	Fayette	I-64	73.8	10.4%	11	29,578
75	Fayette	KY 4	3.5	10.7%	12	55,194
76	Laurel	DB 9006	9.2	10.5%	2	7,240
77	Lawrence	US 23	5.6	10.0%	2	9,405
80	Jefferson	US 31E	7.85	9.3%	14	28,176
84	Jefferson	KY 61	0.1	9.5%	14	23,615
90	Fayette	I-75	100.5	9.4%	11	60,862
91	Simpson	I-65	2.048	10.7%	1	40,969
92	Jefferson	I-64	2.6	10.0%	11	69,270
93	Kenton	I-75	188	8.5%	11	144,680
94	Jefferson	I-264	15	9.4%	11	140,519
96	Campbell	I-471	1.9	10.6%	11	90,607
97	Campbell	I-275	76.4	N/A	11	72,152
98	Jefferson	I-265	16.134	10.8%	11	65,883
99	Jefferson	I-65	133.414	8.8%	11	121,754

**TABLE 3B**  
**2002 Index Station Locations and ADTs**

IS#	County	Route	Milepoint	2002 ADT
I10	Jefferson	I 71	7.015	58,200
I11	Oldham	I 71	17.994	46,700
I12	Gallatin	I 71	65.832	30,600
I20	McCracken	I 24	1.476	27,300
I21	McCracken	I 24	8.711	37,700
I22	Lyon	I 24	43.148	16,200
I23	Christian	I 24	79.195	16,500
I24	Christian	I 24	91.079	28,600
I30	Boone	I 275	5.503	45,900
I31	Boone	I 275	1.788	81,400
I32	Kenton	I 275	79.28	95,900
I33	Campbell	I 471	4.288	55,000
I34	Campbell	I 471	4.867	97,900
I40	Jefferson	I 64	6.027	94,900
I41	Jefferson	I 64	15.984	100,000
I42	Fayette	I 64	84.263	35,200
I43	Montgomery	I 64	106.941	25,000
I44	Rowan	I 64	135.102	20,800
I45	Boyd	I 64	191.116	26,600
I50	Warren	I 65	25.178	45,300
I51	Warren	I 65	40.201	37,900
I52	Hart	I 65	67.279	31,900
I53	Jefferson	I 65	124.08	86,800
I54	Jefferson	I 65	127.488	129,000
I55	Jefferson	I 65	131.864	136,000
I70	Whitley	I 75	26.303	32,700
I71	Rockcastle	I 75	67.708	45,600
I72	Madison	I 75	82.593	44,900
I73	Fayette	I 75	110.466	69,600
I74	Fayette	I 75	116.593	74,200
I75	Scott	I 75	132.834	34,200
I76	Kenton	I 75	167.851	50,400
I77	Boone	I 75	179.095	118,000
I78	Boone	I 75	182.886	173,000
I79	Kenton	I 75	191.5	137,000
I80	Jefferson	I 264	2.099	55,200
I81	Jefferson	I 264	8.357	90,200
I82	Jefferson	I 264	13.166	177,000
I83	Jefferson	I 264	21.111	68,500
I84	Jefferson	I 265	10.994	89,500
I85	Jefferson	I 265	19.401	58,700
I86	Jefferson	I 265	26.169	68,000
I87	Jefferson	I 265	33.338	49,700

**TABLE 4A**  
**Functional Class K-Factors and D-Factors for 2002**

FC #	FC Description	K-Factors	D-Factors	
			Off Peak Direction	Peak Direction
1	Rural Interstate	10.4	43.0%	57.0%
2	Rural Principal Arterial	10.6	42.5%	57.5%
6	Rural Minor Arterial	11.1	43.0%	57.0%
7	Rural Major Collector	11.6	37.0%	63.0%
8	Rural Minor Collector	11.6	43.0%	57.0%
11	Urban Interstate	10	43.5%	56.5%
12	Urban Other Freeway	10.7	42.0%	58.0%
14	Urban Principal Arterial	10.2	40.5%	59.5%
16	Urban Minor Arterial	9.8	43.5%	56.5%
17	Urban Collector	12.6	41.5%	58.5%
	Rural Recreational	16.5	44.0%	56.0%

Notes

1. Calculated from data collected at automatic traffic recorders (ATRs) over 1994-2002 period.
2. K-factor is based on the 30th highest hour of year.
3. Directional factors based on average of the 10th through 50th highest hours in the year.
4. New class of rural recreational uses ATRs from FCs 2 & 6 on heavily recreational roads.

**TABLE 4B**  
**2002 - 2022 Functional Class Average Growth Rate Multipliers**

FC #	FC Description	20-year Multiplier	Growth Rate
1	Rural Interstate *	1.93	3.35%
2	Rural Principal Arterial	1.91	3.30%
6	Rural Minor Arterial	1.70	2.70%
7	Rural Major Collector	1.50	2.05%
8	Rural Minor Collector	1.32	1.40%
9	Rural Local	1.32	1.40%
11	Urban Interstate *	1.81	3.00%
12	Urban Other Freeway	1.93	3.35%
14	Urban Principal Arterial	1.43	1.80%
16	Urban Minor Arterial	1.37	1.60%
17	Urban Collector	1.26	1.15%
19	Urban Local	1.26	1.15%

Interstate	20-year Multiplier	Growth Rate
I-24	2.29	4.24%
I-64	1.8	2.97%
I-65	1.64	2.49%
I-71	1.98	3.48%
I-75	2.08	3.72%
I-264	2.3	4.26%
I-265	1.63	2.48%
I-275	2.54	4.77%
I-471	1.45	1.87%

**TABLE 4C**  
**Aggregate Class ESAL Defaults**

Agg. class	FCs	T%	GR	A/T	GR	EALs/A	GR	A/CT	GR	EALs/CA	GR
I	1	30.159	1.500	4.492	0.067	0.22	1.996	4.778	0.000	0.880	1.913
II	2,6	12.052	1.500	3.526	0.575	0.22	2.000	4.995	1.219	3.223	2.000
III	7,8,9	8.823	1.500	2.996	1.087	0.221	0.000	4.576	0.000	1.682	2.000
IV	11	14.950	1.500	4.141	1.5	0.189	1.381				
V	12,14	7.661	1.500	3.196	1.462	0.218	1.988	4.453	0.000	1.479	2.000
VI	16,17,19	6.899	1.500	2.844	1.5	0.152	0.000	4.466	1.340	1.001	0.000

Note: Negative growth rates were rounded to 0%, a maximum growth rate of 1.5% was used for T% and A/T, and a maximum growth rate of 2% was used for EALs/A.

**TABLE 4D**  
**Functional Classes/Aggregate Classes**

FC #	FC Description	Aggregate Class #
1	Rural Interstate	I
2	Rural Principal Arterial	II
6	Rural Minor Arterial	II
7	Rural Major Collector	III
8	Rural Minor Collector	III
9	Rural Local	III
11	Urban Interstate	IV
12	Urban Other Freeway & Expressways	V
14	Urban Other Principal Arterials	V
16	Urban Minor Arterials	VI
17	Urban Collectors	VI
19	Urban Local	VI

Note: Aggregate classes are used for weigh-in-motion data aggregation purposes.

**TABLE 4E**  
**2002 Travel Activity by Vehicle Type**

Functional System	Motorcycles	Passenger Cars	Other 2-Axle 4-Tire	Busses	Single-Unit Trucks	Combination Trucks	T% Total
<b>Rural</b>							
Interstate	0.100	52.569	18.288	0.698	3.961	24.384	29.043
Other arterial	0.413	60.706	23.990	0.677	5.761	8.453	14.891
Other rural	0.440	65.726	23.104	0.825	5.739	4.166	10.730
<b>Urban</b>							
Interstate	0.035	69.531	12.590	0.618	2.476	14.749	17.843
Other arterial	0.251	66.962	24.501	0.522	3.882	3.882	8.286
Other urban	0.279	65.838	27.472	1.167	3.561	1.683	6.411

**TABLE 4F**  
**2002 Truck % and Axle Factor Functional Class Averages**

Functional Class		Truck %	Axle Factor
R U R A L	1 Interstate	30.7	0.73
	2 Other Principal Arterial	17.8	0.87
	6 Minor Arterial	14.0	0.88
	7 Major Collector	12.4	0.93
	8 Minor Collector	10.3	0.95
	9 Local	8.6	0.97
	11 Interstate	16.1	0.86
	12 Other Freeways & Expressways	20.0	0.84
	14 Other Principal Arterial	6.9	0.94
U R B A N	16 Minor Arterial	8.2	0.96
	17 Collector	7.5	0.97

**TABLE 4G**  
**2003 Monthly Volume Count Factors**

Functional Class		Factor Period	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	Rural Interstate	All Week	1.23	1.14	1.03	0.99	0.97	0.91	0.91	0.92	0.99	0.98	0.99	1.08
		Weekend	1.34	1.17	1.01	0.99	0.98	0.89	0.90	0.89	0.99	0.97	0.99	1.10
		Weekday	1.17	1.12	1.04	0.99	0.97	0.93	0.93	0.95	0.98	0.98	1.00	1.07
2	Rural General	All Week	1.18	1.07	1.03	0.97	0.94	0.94	0.96	0.94	0.98	0.98	1.02	1.13
		Weekend	1.23	1.07	1.01	0.98	0.94	0.93	0.96	0.93	0.99	0.99	1.00	1.11
		Weekday	1.16	1.08	1.03	0.97	0.95	0.95	0.96	0.96	0.98	0.98	1.04	1.13
3	Urban General	All Week	1.10	1.02	0.99	0.97	0.95	0.96	0.99	0.97	1.00	1.00	1.03	1.07
		Weekend	1.14	1.03	0.98	0.97	0.96	0.95	1.00	0.96	1.01	1.01	1.01	1.06
		Weekday	1.07	1.02	1.00	0.96	0.95	0.97	0.99	0.98	1.00	1.00	1.04	1.08
4	Rural Recreation	All Week	1.35	1.21	1.10	0.96	0.87	0.79	0.76	0.84	0.96	1.06	1.22	1.44
		Weekend	1.50	1.26	1.14	0.98	0.83	0.76	0.75	0.78	0.94	1.06	1.26	1.55
		Weekday	1.24	1.17	1.07	0.95	0.90	0.83	0.76	0.89	0.99	1.06	1.19	1.36
5	Urban Interstate	All Week	1.09	1.03	0.99	0.97	0.97	0.96	0.99	0.97	1.03	1.00	1.02	1.07
		Weekend	1.15	1.05	0.97	0.98	0.98	0.94	0.98	0.95	1.04	1.01	1.01	1.04
		Weekday	1.06	1.02	0.99	0.97	0.97	0.97	0.99	0.98	1.01	1.00	1.03	1.08

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These factors were calculated using ATR data spanning a three year period from 2000-2002

**TABLE 4H**  
**Hourly Volume Percentage by Functional Class**

**FC 1: Rural Interstate**

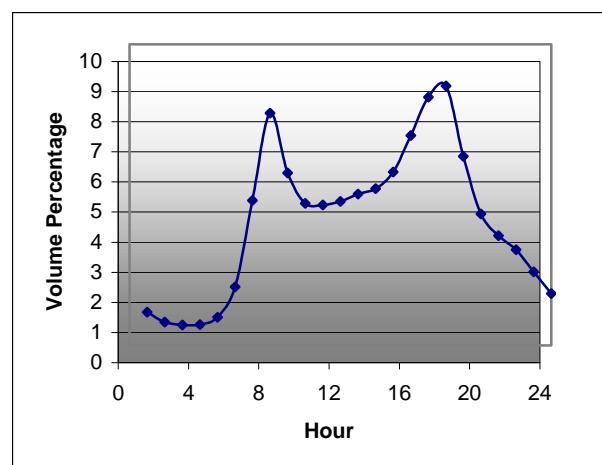
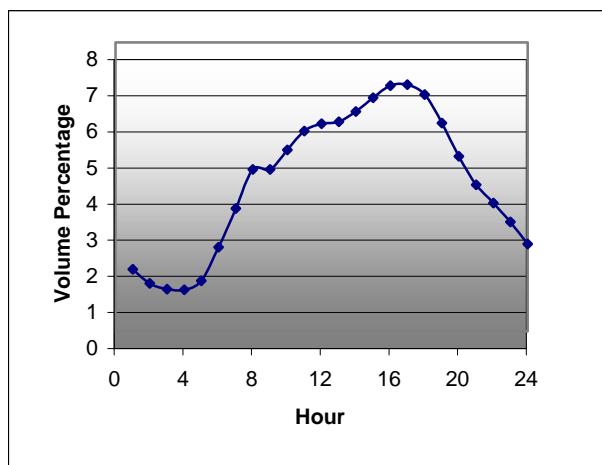
Hour	Percentage
24:00 - 1:00	1.72
1:00 - 2:00	1.33
2:00 - 3:00	1.17
3:00 - 4:00	1.15
4:00 - 5:00	1.4
5:00 - 6:00	2.33
6:00 - 7:00	3.4
7:00 - 8:00	4.48
8:00 - 9:00	4.48
9:00 - 10:00	5.02
10:00 - 11:00	5.55
11:00 - 12:00	5.75
12:00 - 13:00	5.8
13:00 - 14:00	6.09
14:00 - 15:00	6.47
15:00 - 16:00	6.8
16:00 - 17:00	6.83
17:00 - 18:00	6.56
18:00 - 19:00	5.77
19:00 - 20:00	4.85
20:00 - 21:00	4.06
21:00 - 22:00	3.55
22:00 - 23:00	3.03
23:00 - 24:00	2.42

Source: ATR 23

**FC 2: Rural Principal Arterial**

Hour	Percentage
24:00 - 1:00	1.1
1:00 - 2:00	0.78
2:00 - 3:00	0.68
3:00 - 4:00	0.69
4:00 - 5:00	0.94
5:00 - 6:00	1.95
6:00 - 7:00	4.81
7:00 - 8:00	7.71
8:00 - 9:00	5.73
9:00 - 10:00	4.72
10:00 - 11:00	4.66
11:00 - 12:00	4.78
12:00 - 13:00	5.03
13:00 - 14:00	5.21
14:00 - 15:00	5.76
15:00 - 16:00	6.97
16:00 - 17:00	8.25
17:00 - 18:00	8.62
18:00 - 19:00	6.28
19:00 - 20:00	4.37
20:00 - 21:00	3.64
21:00 - 22:00	3.18
22:00 - 23:00	2.44
23:00 - 24:00	1.72

Source: ATR 53



\* Hourly volume percentages come from an average of 1999 weekday ATR data.

**TABLE 4H**  
**Hourly Volume Percentage by Functional Class**

**FC 6: Rural Minor Arterial**

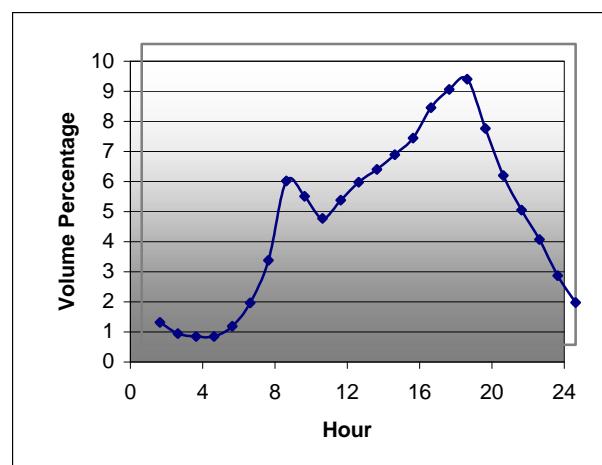
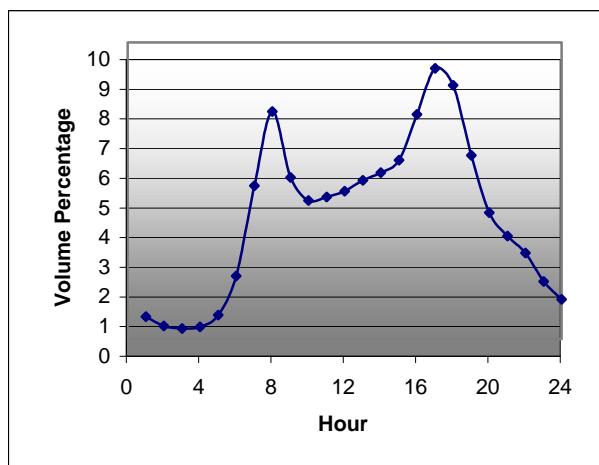
Hour	Percentage
24:00 - 1:00	0.76
1:00 - 2:00	0.45
2:00 - 3:00	0.36
3:00 - 4:00	0.41
4:00 - 5:00	0.81
5:00 - 6:00	2.13
6:00 - 7:00	5.17
7:00 - 8:00	7.67
8:00 - 9:00	5.45
9:00 - 10:00	4.67
10:00 - 11:00	4.79
11:00 - 12:00	4.98
12:00 - 13:00	5.36
13:00 - 14:00	5.61
14:00 - 15:00	6.04
15:00 - 16:00	7.58
16:00 - 17:00	9.13
17:00 - 18:00	8.56
18:00 - 19:00	6.20
19:00 - 20:00	4.26
20:00 - 21:00	3.48
21:00 - 22:00	2.90
22:00 - 23:00	1.95
23:00 - 24:00	1.34

Source: ATR 1 & ATR 29

**FC 7: Rural Major Collector**

Hour	Percentage
24:00 - 1:00	0.74
1:00 - 2:00	0.37
2:00 - 3:00	0.28
3:00 - 4:00	0.28
4:00 - 5:00	0.62
5:00 - 6:00	1.39
6:00 - 7:00	2.81
7:00 - 8:00	5.45
8:00 - 9:00	4.94
9:00 - 10:00	4.20
10:00 - 11:00	4.81
11:00 - 12:00	5.40
12:00 - 13:00	5.83
13:00 - 14:00	6.32
14:00 - 15:00	6.87
15:00 - 16:00	7.88
16:00 - 17:00	8.49
17:00 - 18:00	8.83
18:00 - 19:00	7.19
19:00 - 20:00	5.63
20:00 - 21:00	4.48
21:00 - 22:00	3.50
22:00 - 23:00	2.30
23:00 - 24:00	1.40

Source: ATR 16



\* Hourly volume percentages come from an average of 1999 weekday ATR data.

**TABLE 4H**  
**Hourly Volume Percentage by Functional Class**

**FC 8: Rural Minor Collector**

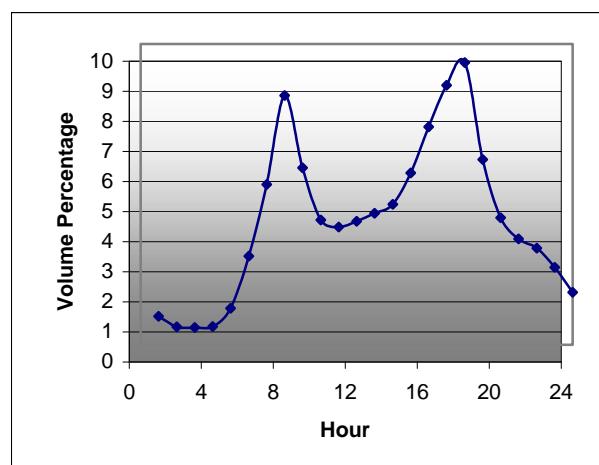
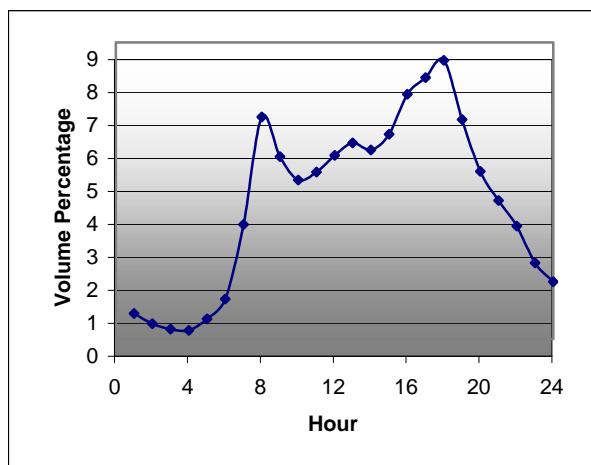
Hour	Percentage
24:00 - 1:00	0.78
1:00 - 2:00	0.47
2:00 - 3:00	0.31
3:00 - 4:00	0.27
4:00 - 5:00	0.61
5:00 - 6:00	1.21
6:00 - 7:00	3.48
7:00 - 8:00	6.74
8:00 - 9:00	5.53
9:00 - 10:00	4.83
10:00 - 11:00	5.07
11:00 - 12:00	5.57
12:00 - 13:00	5.95
13:00 - 14:00	5.74
14:00 - 15:00	6.21
15:00 - 16:00	7.43
16:00 - 17:00	7.94
17:00 - 18:00	8.46
18:00 - 19:00	6.67
19:00 - 20:00	5.09
20:00 - 21:00	4.20
21:00 - 22:00	3.43
22:00 - 23:00	2.32
23:00 - 24:00	1.74

Source: ATR 19 & ATR 43

**FC 11: Urban Interstate**

Hour	Percentage
24:00 - 1:00	0.95
1:00 - 2:00	0.6
2:00 - 3:00	0.57
3:00 - 4:00	0.61
4:00 - 5:00	1.21
5:00 - 6:00	2.95
6:00 - 7:00	5.33
7:00 - 8:00	8.29
8:00 - 9:00	5.88
9:00 - 10:00	4.15
10:00 - 11:00	3.91
11:00 - 12:00	4.11
12:00 - 13:00	4.37
13:00 - 14:00	4.67
14:00 - 15:00	5.71
15:00 - 16:00	7.25
16:00 - 17:00	8.63
17:00 - 18:00	9.38
18:00 - 19:00	6.16
19:00 - 20:00	4.22
20:00 - 21:00	3.52
21:00 - 22:00	3.21
22:00 - 23:00	2.57
23:00 - 24:00	1.75

Source: ATR 98



\* Hourly volume percentages come from an average of 1999 weekday ATR data.

**TABLE 4H**  
**Hourly Volume Percentage by Functional Class**

**FC 12: Urban Other Freeway**

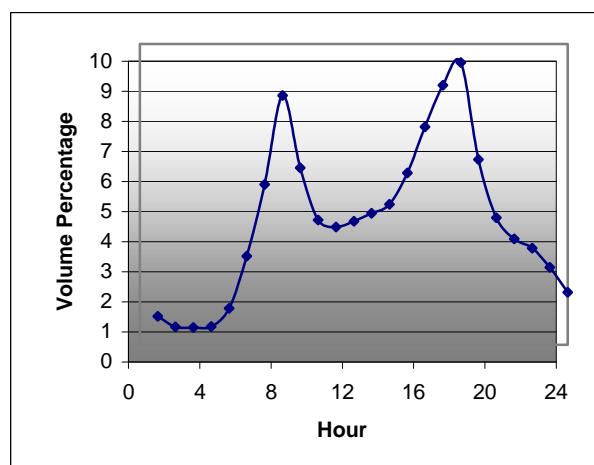
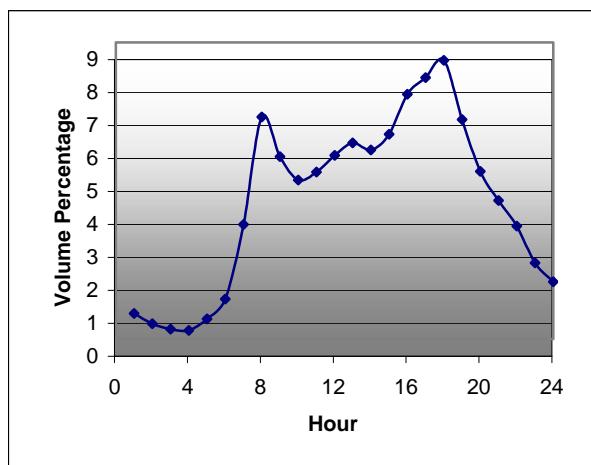
Hour	Percentage
24:00 - 1:00	0.73
1:00 - 2:00	0.44
2:00 - 3:00	0.44
3:00 - 4:00	0.54
4:00 - 5:00	0.70
5:00 - 6:00	2.00
6:00 - 7:00	4.89
7:00 - 8:00	8.32
8:00 - 9:00	6.50
9:00 - 10:00	4.51
10:00 - 11:00	4.39
11:00 - 12:00	4.96
12:00 - 13:00	5.41
13:00 - 14:00	5.34
14:00 - 15:00	5.85
15:00 - 16:00	7.42
16:00 - 17:00	8.68
17:00 - 18:00	8.90
18:00 - 19:00	6.07
19:00 - 20:00	4.20
20:00 - 21:00	3.38
21:00 - 22:00	2.89
22:00 - 23:00	2.04
23:00 - 24:00	1.37

Source: ATR 75

**FC 14: Urban Principal Arterial**

Hour	Percentage
24:00 - 1:00	0.84
1:00 - 2:00	0.54
2:00 - 3:00	0.40
3:00 - 4:00	0.38
4:00 - 5:00	0.89
5:00 - 6:00	2.13
6:00 - 7:00	4.64
7:00 - 8:00	5.99
8:00 - 9:00	4.62
9:00 - 10:00	4.34
10:00 - 11:00	4.84
11:00 - 12:00	6.44
12:00 - 13:00	6.99
13:00 - 14:00	6.02
14:00 - 15:00	6.45
15:00 - 16:00	7.95
16:00 - 17:00	8.44
17:00 - 18:00	7.44
18:00 - 19:00	6.23
19:00 - 20:00	4.64
20:00 - 21:00	3.65
21:00 - 22:00	2.77
22:00 - 23:00	2.01
23:00 - 24:00	1.41

Source: ATR 7 & ATR 66



\* Hourly volume percentages come from an average of 1999 weekday ATR data.

**TABLE 4H**  
**Hourly Volume Percentage by Functional Class**

**FC 16: Urban Minor Arterial**

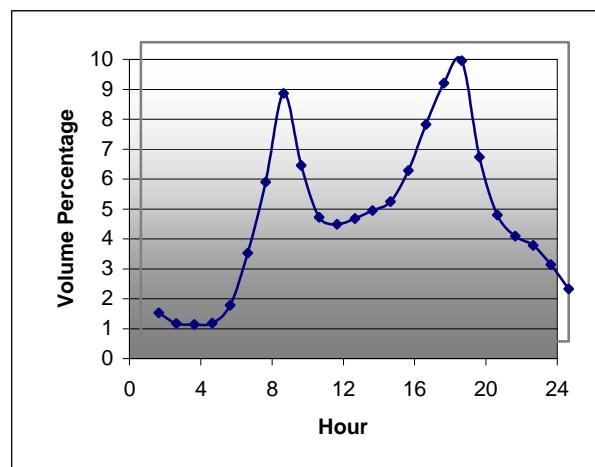
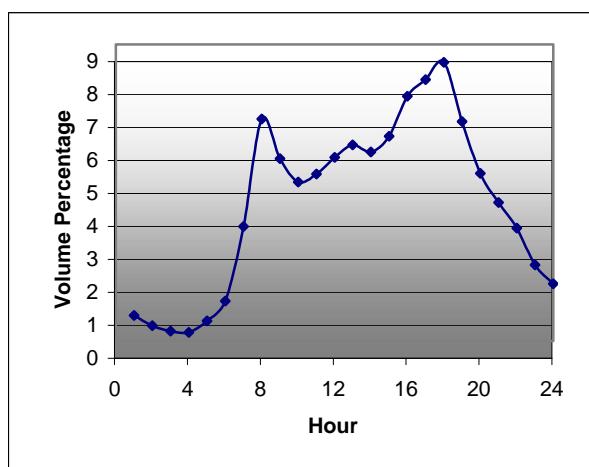
Hour	Percentage
24:00 - 1:00	0.78
1:00 - 2:00	0.47
2:00 - 3:00	0.31
3:00 - 4:00	0.27
4:00 - 5:00	0.61
5:00 - 6:00	1.21
6:00 - 7:00	3.48
7:00 - 8:00	6.74
8:00 - 9:00	5.53
9:00 - 10:00	4.83
10:00 - 11:00	5.07
11:00 - 12:00	5.57
12:00 - 13:00	5.95
13:00 - 14:00	5.74
14:00 - 15:00	6.21
15:00 - 16:00	7.43
16:00 - 17:00	7.94
17:00 - 18:00	8.46
18:00 - 19:00	6.67
19:00 - 20:00	5.09
20:00 - 21:00	4.20
21:00 - 22:00	3.43
22:00 - 23:00	2.32
23:00 - 24:00	1.74

Source: ATR 14 & ATR 45

**FC 17: Urban Collector**

Hour	Percentage
24:00 - 1:00	0.95
1:00 - 2:00	0.6
2:00 - 3:00	0.57
3:00 - 4:00	0.61
4:00 - 5:00	1.21
5:00 - 6:00	2.95
6:00 - 7:00	5.33
7:00 - 8:00	8.29
8:00 - 9:00	5.88
9:00 - 10:00	4.15
10:00 - 11:00	3.91
11:00 - 12:00	4.11
12:00 - 13:00	4.37
13:00 - 14:00	4.67
14:00 - 15:00	5.71
15:00 - 16:00	7.25
16:00 - 17:00	8.63
17:00 - 18:00	9.38
18:00 - 19:00	6.16
19:00 - 20:00	4.22
20:00 - 21:00	3.52
21:00 - 22:00	3.21
22:00 - 23:00	2.57
23:00 - 24:00	1.75

Source: ATR 3



\* Hourly volume percentages come from an average of 1999 weekday ATR data.

**TABLE 5**  
**Kentucky County Population Projections**

County	Census		Projections					
	1990	2000	2005	2010	2015	2020	2025	2030
Adair	15,360	17,244	18,191	19,138	20,144	21,162	22,127	23,038
Allen	14,628	17,800	19,925	22,169	24,616	27,240	30,021	32,939
Anderson	14,571	19,111	21,977	25,036	28,495	32,347	36,492	40,853
Ballard	7,902	8,286	8,597	8,868	9,142	9,413	9,656	9,857
Barren	34,001	38,033	40,366	42,640	44,978	47,300	49,502	51,524
Bath	9,692	11,085	11,882	12,681	13,496	14,321	15,128	15,891
Bell	31,506	30,060	29,396	28,588	27,588	26,453	25,207	23,856
Boone	57,589	85,991	104,982	126,036	150,709	179,528	212,412	249,143
Bourbon	19,236	19,360	19,392	19,350	19,260	19,110	18,854	18,491
Boyd	51,150	49,752	49,095	48,148	46,975	45,631	44,094	42,372
Boyle	25,641	27,697	28,503	29,273	30,085	30,888	31,573	32,065
Bracken	7,766	8,279	8,698	9,107	9,517	9,902	10,253	10,564
Breathitt	15,703	16,100	16,414	16,627	16,734	16,702	16,550	16,282
Breckinridge	16,312	18,648	20,130	21,554	22,998	24,447	25,846	27,178
Bullitt	47,567	61,236	69,571	77,928	86,778	96,050	105,481	114,909
Butler	11,245	13,010	14,232	15,454	16,741	18,105	19,497	20,895
Caldwell	13,232	13,060	13,047	12,988	12,877	12,723	12,517	12,246
Calloway	30,735	34,177	35,692	37,317	38,631	39,790	40,846	41,932
Campbell	83,866	88,616	90,700	92,385	93,818	94,931	95,542	95,547
Carlisle	5,238	5,351	5,448	5,530	5,605	5,687	5,759	5,807
Carroll	9,292	10,155	10,815	11,442	12,048	12,626	13,166	13,645
Carter	24,340	26,889	28,214	29,406	30,544	31,564	32,425	33,122
Casey	14,211	15,447	16,181	16,853	17,464	18,033	18,550	18,988
Christian	68,941	72,265	73,955	74,791	75,147	75,404	75,345	74,633
Clark	29,496	33,144	35,135	36,932	38,631	40,226	41,637	42,813
Clay	21,746	24,556	26,152	27,615	28,938	30,020	30,904	31,553
Clinton	9,135	9,634	9,890	10,079	10,223	10,318	10,345	10,299
Crittenden	9,196	9,384	9,533	9,645	9,733	9,783	9,774	9,695
Cumberland	6,784	7,147	7,385	7,580	7,747	7,892	8,008	8,085
Daviess	87,189	91,545	92,994	94,022	94,772	95,221	95,237	94,749
Edmonson	10,357	11,644	12,428	13,152	13,854	14,536	15,180	15,775
Elliott	6,455	6,748	6,940	7,122	7,279	7,394	7,460	7,494
Estill	14,614	15,307	15,730	16,048	16,283	16,424	16,460	16,373
Fayette	225,366	260,512	279,005	295,664	311,436	326,446	340,043	351,829
Fleming	12,292	13,792	14,818	15,851	16,929	18,034	19,127	20,198
Floyd	43,586	42,441	41,893	41,052	39,881	38,419	36,688	34,674
Franklin	44,143	47,687	49,196	50,440	51,469	52,255	52,710	52,789
Fulton	8,271	7,752	7,580	7,419	7,257	7,089	6,907	6,706
Gallatin	5,393	7,870	9,618	11,638	14,063	16,911	20,200	23,981
Garrard	11,579	14,792	16,943	19,251	21,840	24,683	27,722	30,920
Grant	15,737	22,384	27,063	32,341	38,599	45,939	54,408	64,125
Graves	33,550	37,028	39,038	41,071	43,261	45,573	47,907	50,203
Grayson	21,050	24,053	25,908	27,698	29,490	31,248	32,950	34,572
Green	10,371	11,518	12,144	12,765	13,412	14,066	14,713	15,339
Greenup	36,742	36,891	37,086	36,989	36,668	36,190	35,566	34,798
Hancock	7,864	8,392	8,720	8,984	9,240	9,471	9,645	9,761
Hardin	89,240	94,174	97,374	100,278	102,989	105,299	107,223	108,851
Harlan	36,574	33,202	31,591	29,893	28,088	26,228	24,319	22,347
Harrison	16,248	17,983	19,195	20,380	21,590	22,772	23,861	24,815
Hart	14,890	17,445	19,151	20,854	22,638	24,504	26,452	28,449

**TABLE 5**  
**Kentucky County Population Projections**

County	Census		Projections					
	1990	2000	2005	2010	2015	2020	2025	2030
Henderson	43,044	44,829	45,701	46,303	46,729	46,933	46,831	46,414
Henry	12,823	15,060	16,491	17,912	19,386	20,884	22,359	23,784
Hickman	5,566	5,262	5,116	4,987	4,853	4,712	4,549	4,360
Hopkins	46,126	46,519	46,665	46,644	46,460	46,077	45,442	44,552
Jackson	11,955	13,495	14,504	15,490	16,492	17,460	18,368	19,209
Jefferson	665,123	693,604	706,907	717,376	725,967	732,776	737,210	738,510
Jessamine	30,508	39,041	43,521	48,116	53,174	58,647	64,346	70,114
Johnson	23,248	23,445	23,592	23,550	23,349	23,002	22,477	21,765
Kenton	142,031	151,464	156,074	159,730	162,859	165,463	167,219	167,873
Knott	17,906	17,649	17,449	17,145	16,726	16,173	15,497	14,717
Knox	29,676	31,795	32,856	33,751	34,527	35,124	35,521	35,721
Larue	11,679	13,373	14,397	15,406	16,481	17,632	18,797	19,940
Laurel	43,438	52,715	58,091	63,370	68,810	74,334	79,783	85,088
Lawrence	13,998	15,569	16,678	17,696	18,643	19,503	20,287	20,971
Lee	7,422	7,916	8,214	8,483	8,692	8,830	8,896	8,883
Leslie	13,642	12,401	11,713	10,999	10,241	9,454	8,646	7,828
Letcher	27,000	25,277	24,546	23,660	22,620	21,452	20,169	18,772
Lewis	13,029	14,092	14,860	15,577	16,253	16,877	17,446	17,950
Lincoln	20,045	23,361	25,450	27,520	29,709	32,012	34,336	36,637
Livingston	9,062	9,804	10,298	10,763	11,221	11,651	12,032	12,350
Logan	24,416	26,573	27,993	29,362	30,754	32,140	33,450	34,643
Lyon	6,624	8,080	8,812	9,609	10,522	11,499	12,509	13,585
McCracken	62,879	65,514	66,566	67,329	67,926	68,329	68,391	68,004
McCreary	15,603	17,080	18,135	19,082	19,954	20,745	21,439	22,029
McLean	9,628	9,938	10,224	10,457	10,683	10,889	11,042	11,141
Madison	57,508	70,872	77,378	83,629	89,741	96,102	102,500	108,732
Magoffin	13,077	13,332	13,515	13,590	13,559	13,454	13,253	12,954
Marion	16,499	18,212	19,138	20,049	20,975	21,886	22,751	23,533
Marshall	27,205	30,125	31,598	32,970	34,325	35,607	36,736	37,677
Martin	12,526	12,578	12,652	12,597	12,418	12,165	11,856	11,459
Mason	16,666	16,800	16,929	16,966	16,930	16,834	16,658	16,362
Meade	24,170	26,349	27,647	28,963	30,417	32,045	33,852	35,873
Menifee	5,092	6,556	7,471	8,407	9,403	10,445	11,526	12,645
Mercer	19,148	20,817	21,735	22,549	23,339	24,110	24,795	25,353
Metcalfe	8,963	10,037	10,719	11,377	12,050	12,727	13,392	14,044
Monroe	11,401	11,756	12,028	12,246	12,415	12,538	12,614	12,644
Montgomery	19,561	22,554	24,349	26,089	27,841	29,617	31,394	33,106
Morgan	11,648	13,948	15,258	16,621	18,026	19,368	20,635	21,824
Muhlenberg	31,318	31,839	32,072	32,136	32,033	31,768	31,323	30,678
Nelson	29,710	37,477	42,078	46,792	51,905	57,328	62,881	68,458
Nicholas	6,725	6,813	6,869	6,895	6,884	6,849	6,790	6,695
Ohio	21,105	22,916	24,119	25,271	26,374	27,413	28,354	29,167
Oldham	33,263	46,178	54,441	62,789	71,753	81,508	91,920	102,650
Owen	9,035	10,547	11,575	12,618	13,728	14,911	16,129	17,361
Owsley	5,036	4,858	4,797	4,712	4,610	4,492	4,352	4,186
Pendleton	12,036	14,390	16,004	17,690	19,496	21,385	23,314	25,261
Perry	30,283	29,390	28,870	28,105	27,111	25,930	24,590	23,077
Pike	72,583	68,736	66,710	64,207	61,342	58,214	54,818	51,158
Powell	11,686	13,237	14,189	15,063	15,866	16,590	17,247	17,820
Pulaski	49,489	56,217	59,875	63,228	66,448	69,558	72,471	75,092

**TABLE 5**  
**Kentucky County Population Projections**

County	Census		Projections					
	1990	2000	2005	2010	2015	2020	2025	2030
Robertson	2,124	2,266	2,340	2,411	2,476	2,528	2,570	2,597
Rockcastle	14,803	16,582	17,680	18,723	19,716	20,662	21,530	22,299
Rowan	20,353	22,094	22,490	22,856	23,021	23,131	23,136	23,005
Russell	14,716	16,315	17,122	17,830	18,494	19,088	19,584	19,986
Scott	23,867	33,061	38,696	44,851	51,981	60,146	69,167	78,858
Shelby	24,824	33,337	38,811	44,723	51,426	58,906	67,006	75,621
Simpson	15,145	16,405	17,098	17,737	18,411	19,105	19,732	20,260
Spencer	6,801	11,766	15,640	20,416	26,520	34,226	43,718	55,221
Taylor	21,146	22,927	23,622	24,227	24,758	25,168	25,444	25,611
Todd	10,940	11,971	12,671	13,365	14,109	14,871	15,620	16,347
Trigg	10,361	12,597	14,136	15,740	17,472	19,345	21,352	23,468
Trimble	6,090	8,125	9,545	11,134	12,976	15,079	17,408	19,984
Union	16,557	15,637	15,361	15,070	14,776	14,478	14,157	13,813
Warren	77,720	92,522	100,331	108,054	116,102	124,518	133,234	142,201
Washington	10,441	10,916	11,130	11,301	11,457	11,582	11,654	11,658
Wayne	17,468	19,923	21,411	22,863	24,348	25,838	27,284	28,684
Webster	13,955	14,120	14,362	14,573	14,755	14,856	14,876	14,824
Whitley	33,326	35,865	37,208	38,411	39,522	40,466	41,201	41,720
Wolfe	6,503	7,065	7,413	7,715	7,975	8,197	8,376	8,501
Woodford	19,955	23,208	24,896	26,427	27,897	29,288	30,485	31,408
Kenucky (total)	<b>3,686,891</b>	<b>4,041,769</b>	<b>4,246,743</b>	<b>4,442,374</b>	<b>4,640,916</b>	<b>4,843,219</b>	<b>5,043,016</b>	<b>5,235,685</b>

**TABLE 6**  
**Socioeconomic Data and Travel Data Sources**

Data Source	Update Cycle	Last Update	Data Parameters	Data Provider	Web Address
National Personal Trans. Survey (NPTS)	5 years	1995	Travel by trip purpose and mode, social/economic trip characteristics, vehicle ownership, others	FHWA/BTS	<a href="http://www.bts.gov/ntda/npts/">www.bts.gov/ntda/npts/</a>
American Travel Survey (ATS)	5 years	1995	Long range (75 miles or greater) trip data	FHWA/BTS	<a href="http://www.bts.gov/programs/ats/">www.bts.gov/programs/ats/</a>
Census Trans. Planning Package (CTTP)	10 years	1990	Housing units, households, person, and workers in Census areas. Journey to Work.	Census/BTS	Available on CD Rom
Origin-destination (O-D) Surveys	On Demand	NA	TAZ trip exchanges	Private Sector	
Household Surveys *	On Demand	NA	TAZ tripmaking	Private Sector	
Commodity Flow Survey (CFS)	5 years	1997	Truck shipments by value, tons, ton-mile and state to state	Census	<a href="http://www.bts.gov/ntda/cfs">www.bts.gov/ntda/cfs</a>
Truck Inventory and Use Survey (TIUS)	5 years	1997	Physical and operational characteristics of trucks	FHWA/BTS	<a href="http://www.bts.gov/ntda/tius">www.bts.gov/ntda/tius</a>
TRIS Online	Continuous	2000	448,000 books, articles, and journals	FHWA/BTS	<a href="http://199.79.179.82/sundev/search.cfm">http://199.79.179.82/sundev/search.cfm</a>
TransBorder Surface Freight Data	Monthly	Dec., 1999	North American trade flows by commodity type	FHWA/BTS	<a href="http://www.bts.gov/transborder/">www.bts.gov/transborder/</a>
TRANSEARCH	Continuous	2001	Freight and freightage shipments in US by county	Reebie Associates	<a href="http://www.reebie.com">www.reebie.com</a>
Kentucky State Data Center	Continuous	2002	Demographics	University of Louisville	<a href="http://cbpa.louisville.edu/ksdc/">http://cbpa.louisville.edu/ksdc/</a>
Kentucky Economic Development Information System	Continuous	2002	Demographics, workforce, business,etc.	KY Cabinet for Economics Development	<a href="http://www.thinkkentucky.com/edis/">http://www.thinkkentucky.com/edis/</a>

\* Kentucky MPOs that have performed household surveys recently are Cincinnati (OKI), Louisville (KIPDA) and Evansville (EUTS).

**TABLE 7**  
**Vehicle Miles Traveled Statewide Totals by Functional Class**

Year	Total DVMT	Rural DVMT (x1,000)						Urban DVMT (x1,000)						Rural Miles						Urban Miles						Total Mileage					
		INTER.	PR.ART	MN.ART	MJ.COL	MN.COL	LOCAL	INTER.	EXPR.	PR.ART	MN.ART	COLL.	LOCAL	INTER.	PR.ART	MN.ART	MJ.COL	MN.COL	LOCAL	INTER.	EXPR.	PR.ART	MN.ART	COLL.	LOCAL						
		1	2	6	7	8	9			11	12	14	16	17	19			1	2	6	7	8	9			11	12	14	16	17	19
1993	107,448	13,152	13,680	5,994	13,821	6,265	8,222	12,551	1,966	11,320	11,278	4,467	4,732	540	1,926	1,598	6,988	9,488	43,590	223	91	622	1,177	1,144	7,940	75,327					
1994	108,935	13,286	13,554	6,085	14,102	6,307	8,332	13,109	1,905	11,294	11,190	4,806	4,965	536	1,946	1,600	7,019	9,532	44,031	228	91	627	1,189	1,151	8,020	75,970					
1995	111,788	13,939	14,528	6,134	14,218	6,439	8,552	13,689	2,002	11,513	10,906	4,827	5,042	536	2,012	1,612	6,961	9,499	44,475	228	91	635	1,164	1,152	8,101	76,466					
1996	115,416	14,342	15,023	6,382	14,600	6,560	8,713	14,405	2,078	11,851	11,165	5,064	5,233	536	2,011	1,626	6,971	9,492	44,925	228	91	637	1,169	1,155	8,183	77,024					
1997	119,029	15,257	15,915	6,493	14,756	6,782	8,968	14,671	2,144	12,087	11,358	5,216	5,381	536	2,043	1,608	6,970	9,495	45,378	228	91	641	1,165	1,153	8,266	73,028					
1998	122,900	16,181	16,541	6,685	15,102	6,869	9,131	15,385	2,242	12,451	11,567	5,271	5,475	536	2,046	1,612	6,986	9,485	45,837	228	91	654	1,165	1,154	8,349	78,143					
1999	127,268	16,841	17,614	6,956	15,635	7,023	9,373	15,966	2,374	12,666	11,955	5,291	5,574	536	2,053	1,607	6,992	9,511	46,300	226	91	650	1,181	1,144	8,433	78,724					
2000	128,278	16,746	17,217	7,108	15,813	7,094	9,539	16,164	2,297	13,062	12,180	5,370	5,687	533	2,045	1,604	6,994	9,497	46,768	229	90	658	1,185	1,145	8,519	79,266					
2001	127,116	16,674	17,152	7,306	16,035	6,977	9,408	16,069	2,251	12,978	11,967	4,930	5,370	533	2,049	1,634	6,968	9,489	46,453	229	90	657	1,187	1,146	8,501	78,937					
2002	128,405	17,222	17,508	7,358	16,164	6,844	9,202	16,717	2,266	13,045	11,781	4,829	5,470	533	2,052	1,633	6,968	9,476	45,821	229	87	661	1,154	1,120	8,638	78,373					

**Table 8**  
**SMALL URBAN AREA-TRAFFIC MODEL STATUS AND POPULATION**

Small Urban Area	County	First Study Year	Last Study Year	Last S-E Data	Last Traffic Model	Last Study Area Pop	1990 Census Pop	2000 Census Pop	% Diff Pop	Air Quality Concern	
Bardstown	Nelson		1980	1997	1993	11,220	6,801	10,374	52.54%	No	
Berea	Madison		2003	1998	2003	9,210	9,126	9,851	7.94%	No	
Campbellsville	Taylor	1969	1988	1999	1988	13,058	9,577	10,498	9.62%	No	
Central City	Muhlenburg					4,979	5,893	18.36%	No		
Corbin	Whitley		1971	1997	1991	9,782	7,419	7,742	4.35%	No	
Cynthiana	Harrison	1970	1990	1988	1990	7,687	6,497	6,258	-3.68%	No	
Danville	Boyle	1973	1973	1998	1990	13,327	12,420	15,477	24.61%	No	
Dry Ridge/Williamstown	Grant	NA	NA	1988	NA	6,287	4,624	5,222	12.93%	No	
Frankfort	Franklin		2000	2000	2000	35,473	25,968	27,741	6.83%	No	
Franklin	Simpson	1970	1970	1999	1991	9,237	7,607	7,996	5.11%	No	
Georgetown	Scott	1979	1987	1996	2001	13,353	11,414	18,080	58.40%	Yes	
Glasgow	Barren	1970	1988	1999	1988	15,237	12,351	13,019	5.41%	No	
Harrodsburg	Mercer	1970	1970	1999	1989	10,100	7,335	8,014	9.26%	No	
Hopkinsville	Christian	1973	1998	1999	1996	33,167	29,809	30,089	0.94%	No	
Lawrenceburg	Anderson	NA	NA	1999	1991	7,221	5,911	9,014	52.50%	No	
Lebanon	Marion	NA	NA	1996	NA	NA	5,695	5,718	0.40%	No	
Leitchfield	Grayson		1979	2000		4,965	6,139	23.65%	No		
London	Laurel	NA	2001	1999	2001	NA	5,757	5,692	-1.13%	No	
Madisonville	Hopkins	1970	2002	2000	2002	22,481	16,200	19,307	19.18%	No	
Mayfield	Graves	1978	1999	2000	2000	10,981	9,935	10,349	4.17%	No	
Maysville	Mason		2003	1998	2003	9,658	7,169	8,993	25.44%	No	
Middlesboro	Bell		1987	1987	1987	13,636	11,328	10,384	-8.33%	Yes	
Monticello	Wayne			NA	1999	6,241	5,357	5,981	11.65%	No	
Morehead	Rowan		1979	1995	1979	12,230	8,357	5,914	-29.23%	No	
Mt. Sterling	Montgomery		1970	1999	1990	8,705	5,362	5,876	9.59%	No	
Murray	Calloway	1968	1995	1988	1990	14,700	14,439	14,950	3.54%	No	
Paducah	McCracken	1973	2002	1999	2002	50,444	27,256	26,307	-3.48%	No	
Paris	Bourbon			NA	1999	1991	11,195	8,730	9,183	5.19%	No
Pikeville	Pike			1999	1999	1999	NA	6,324	6,295	-0.46%	No
Princeton	Caldwell			1999	1996	1990	7,573	6,940	6,536	-5.82%	No
Richmond	Madison	1978	2003	2000	2003	23,477	21,155	27,152	28.35%	No	
Russellville	Logan	1980	1999	1998	1999	9,004	7,454	7,149	-4.09%	No	
Shelbyville	Shelby		1988	1987	1988	11,019	6,238	10,085	61.67%	No	
Somerset/Ferguson	Pulaski	1969	1977	1999	1993	23,050	11,667	12,233	4.85%	No	
Versailles	Woodford			1999	2000	1990	11,850	7,269	7,511	3.33%	No
Williamsburg	Whitley			NA	1989	NA	8,180	5,493	5,143	-6.37%	No
Winchester	Clark			1971	1999	1989	19,838	15,799	16,724	5.85%	No

**TABLE 9**  
**County Level Transportation Models**

County	Last Study Year	Last S-E Data	Last Traffic Model	Last Study Area Pop	1990 Census Pop	2000 Census Pop	% Diff Pop	Air Quality Concern
Graves	2000	2000	2000	30,732	27,205	30,125	10.7	Yes
Marshall	1999	1999	1999	36,257	33,550	37,028	10.4	Yes
Scott	2000	2000	2000	33,061	23,867	33,061	38.5	Yes
Simpson	2002	2002	2002	16,706	15,145	16,405	8.3	Yes

**TABLE 10**  
**Kentucky Statewide Traffic Model Summary**

### **KYSTM History**

1971: First model, designed by Alan M. Voorhees & Associates  
 1991: Model Update by Wilbur Smith Associates (WSA)  
 1997: Model Update by WSA  
 1999: Model Update by WSA  
 2001: I-66 Corridor Calibration by WSA  
 2002: Combined Zones for Census/TAZ Disaggregation by WSA  
 2003: Network Update by WSA

### **Applications**

- Corridor studies
- New routes
- System questions

### **Current Model Specifications from 1999 Model Update**

This update basically created a completely new model although the 1991 network and TAZs were used.

- Number of zones=1,530 (includes 823 Kentucky zones)
- Number of links=28,282
- Trip purposes: HBW, Truck, Tourist, External, Other Person (Combined NHB/HBO)
- Software: MinUTP
- Current year: 1999; Future year: 2030
- Assignment methodology: AON
- Calibration: 10 screenlines, final ground adjustment program
- Network development: use existing 1991 Kentucky network plus National Highway Planning Network outside of Kentucky
- Data collection: no new data collected

### **Recent Updates**

#### **2001 I-66 Corridor Calibration**

This contract converted KySTM link-based external truck trips to trip table format, updated KySTM network and trip matrices to reflect existing plus committed I-66 conditions, and updated networks/matrices to include I-66 network implementation.

#### **2002 Combined Zone**

This contract revised existing KySTM TAZs.

#### **2003 Network**

This work creates a true GIS network in Trans CAD and expands the network to the entire USA.

#### **2003 Major KySTM Update**

Major update in 2003-2004 includes:

- Updated truck travel submodels using the latest Transearch data.
- Updated long distance submodels using an ATS-based long distance person travel model.
- Updated trip generation/trip distribution using new journey-to-work and NPTS data.
- Development of GISDK procedures.

**TABLE 11**  
**Urbanized Area Model Status and Population**

Urbanized Area	Previous Study Year	Current Study Year	Base Model Year	Future Model Year	Model Counties	Base Year Model Population	Future Year Model Population	% Diff Pop	Urbanized Counties	1990 Urbanized Census Pop	2000 Urbanized Census Pop	% Diff Pop	Air Quality Concern
OKI	1998	2002	1995	2030	Butler (OH), Clermont (OH), Hamilton (OH), Warren (OH), Boone (KY), Campbell (KY), Kenton (KY), Dearborn (IN)	1,837,250	2,331,300	26.89%	Butler (OH), Clermont (OH), Hamilton (OH), Warren (OH), Boone (KY), Campbell (KY), Kenton (KY), Dearborn (IN)				yes
KIPDA	1996	2001	1998	2025	Bullitt (KY), Clark (IN), Floyd (IN), Jefferson (KY), Oldham (KY)	928,845	1,145,285	23.30%	Bullitt(KY)*, Clark (IN)*, Floyd (IN)*, Jefferson (KY)*, Oldham (KY)*	754,956	863,582	14.39%	yes
Lexington	1998	2001	2000	2025	Fayette, Jessamine	269,302	324,227	20.40%	Fayette, Jessamine*	220,701	250,994	13.73%	yes
Ashland	1995	2000	1998	2020	Boyd*, Greenup*	67,742	72,499	7.02%	Boyd*, Greenup*	56,122	56,446	0.58%	yes
Henderson	1997	2001	2000	2025	Henderson*	44,829			Henderson*	26,517	26,593	0.29%	no
Owensboro	1997	2002	1999	2025	Daviess	91,443	97,699	6.84%	Daviess	53,549	54,067	0.97%	yes
Bowling Green	1983	2000	1995	2020	Barren	82,579	112,102	35.75%	Barren	40,641	58,314	43.49%	no
Radcliff/Etown	1993		2003	2030	Hardin, Meade*				Hardin, Meade*		64,504		no

\* partial counties

**TABLE 12**  
**Average Speeds for Nonattainment Areas \***

HPMS Functional Class			1998 statewide HPMS average	HERS (RM) average speeds 2000 HPMS data Edmonson	Owensboro Model 2001 Daviess/Hancock	Ashland Model 2002 Boyd/Greenup	Marshall/Livingston Model 2001	Scott Co. Model 2001	Evansville Study Free-Flow Speeds **	Ohio STTS May 2001 **	Fayette Co. Model (old)
01	R	Interstate	50.4	71.0	NA	64.9	64.4	61.6	70.1	64.0	NA
02	U	Principle Arterial	47.4	51.6	50.4	40.6	55.4	55.0	57.8	54.0	NA
06	R	Minor Arterial	34.9	42.3	40.2	36.9	54.1	54.2	53.6	54.0	NA
07	A	Major Collector	31.5	46.1	33.8	35.9	50.0	50.1	52.4	44.0	NA
08	L	Minor Collector	31.5	NA	32.9	NA	37.6	54.5	52.4	44.0	NA
09		Local	31.5	NA	15.1	10.0	35.0	38.6	40.0	30.0	NA
11	U	Interstate	49.0	62.9	NA	55.0	NA	NA	64.0	63.0	49.0
12	R	Freeway	50.5	58.8	54.5	NA	NA	NA	61.6	63.0	50.5
14	B	Principle Arterial	28.0	38.9	31.2	31.8	NA	50.6	48.4	40.0	28.0
16	A	Minor Arterial	20.6	37.1	39.3	29.7	NA	41.5	45.4	40.0	20.6
17	N	Collector	21.1	37.0	30.7	29.5	NA	45.0	39.0	40.0	21.1
19		Local	21.1	NA	14.1	10.0	NA	34.7	35.0	12.0	21.1

\* not including OKI and KIPDA

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\*\* not non-attainment areas; included for comparison purposes only

# EXHIBIT 1A

## LOUISVILLE 2002 ATR & IS Locations



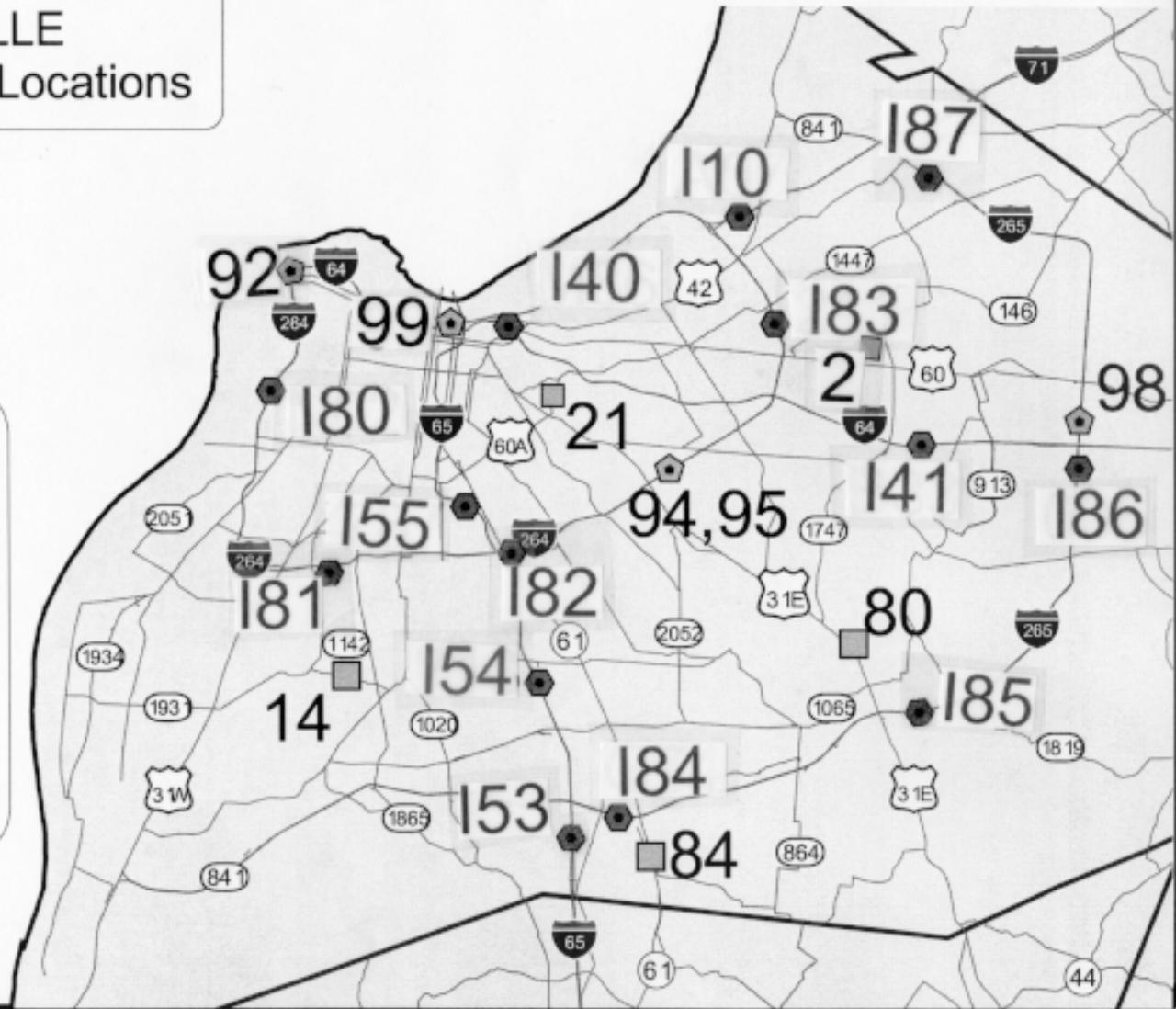
### ATR LOCATIONS

Urban General      ■ # #

Urban Interstate      ⚡ # #

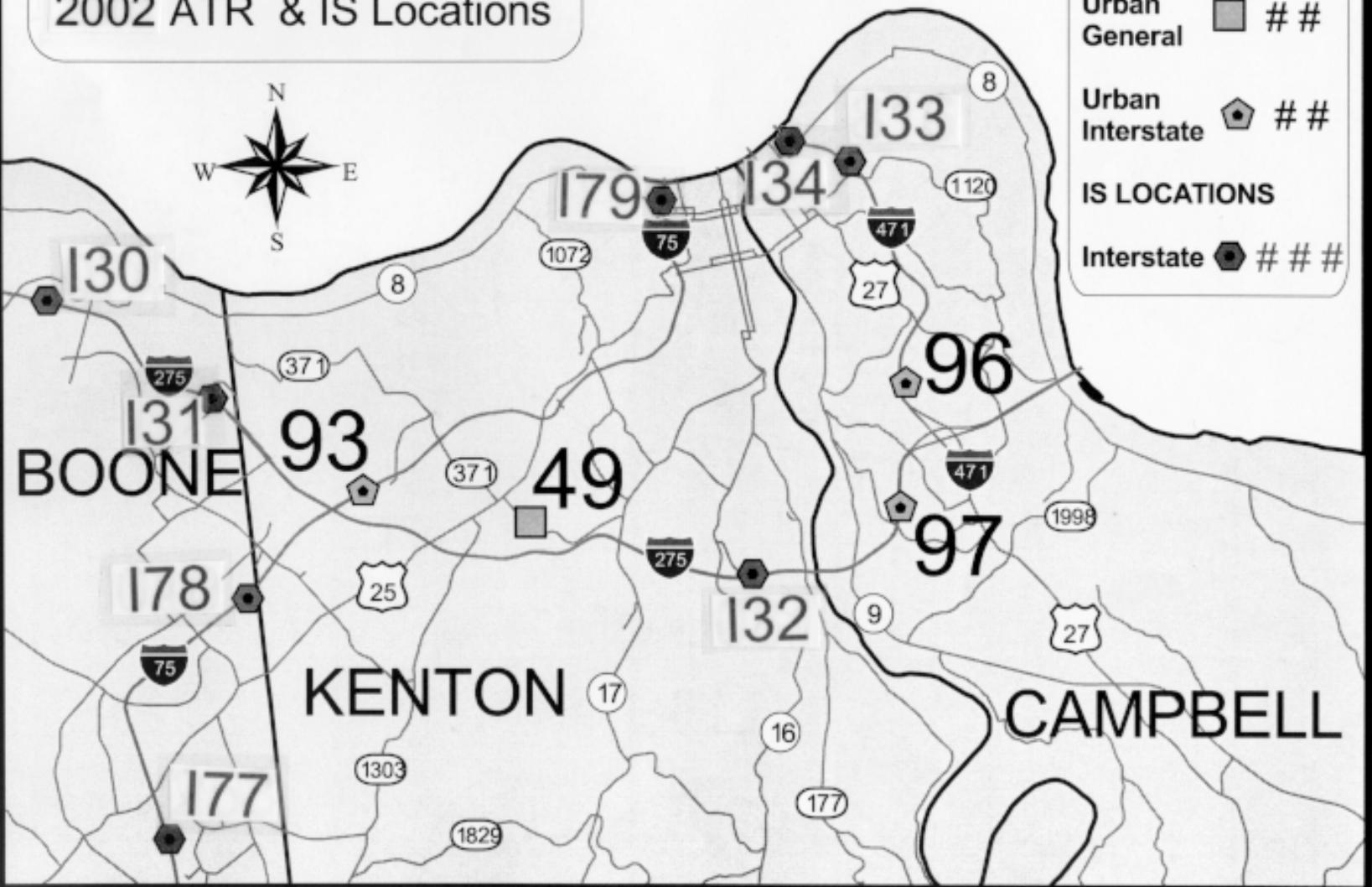
### IS LOCATIONS

Interstate      ⚡ # # #



# EXHIBIT 1B

NORTHERN KENTUCKY  
2002 ATR & IS Locations



## ATR LOCATIONS

Urban General ##

Urban Interstate ##

## IS LOCATIONS

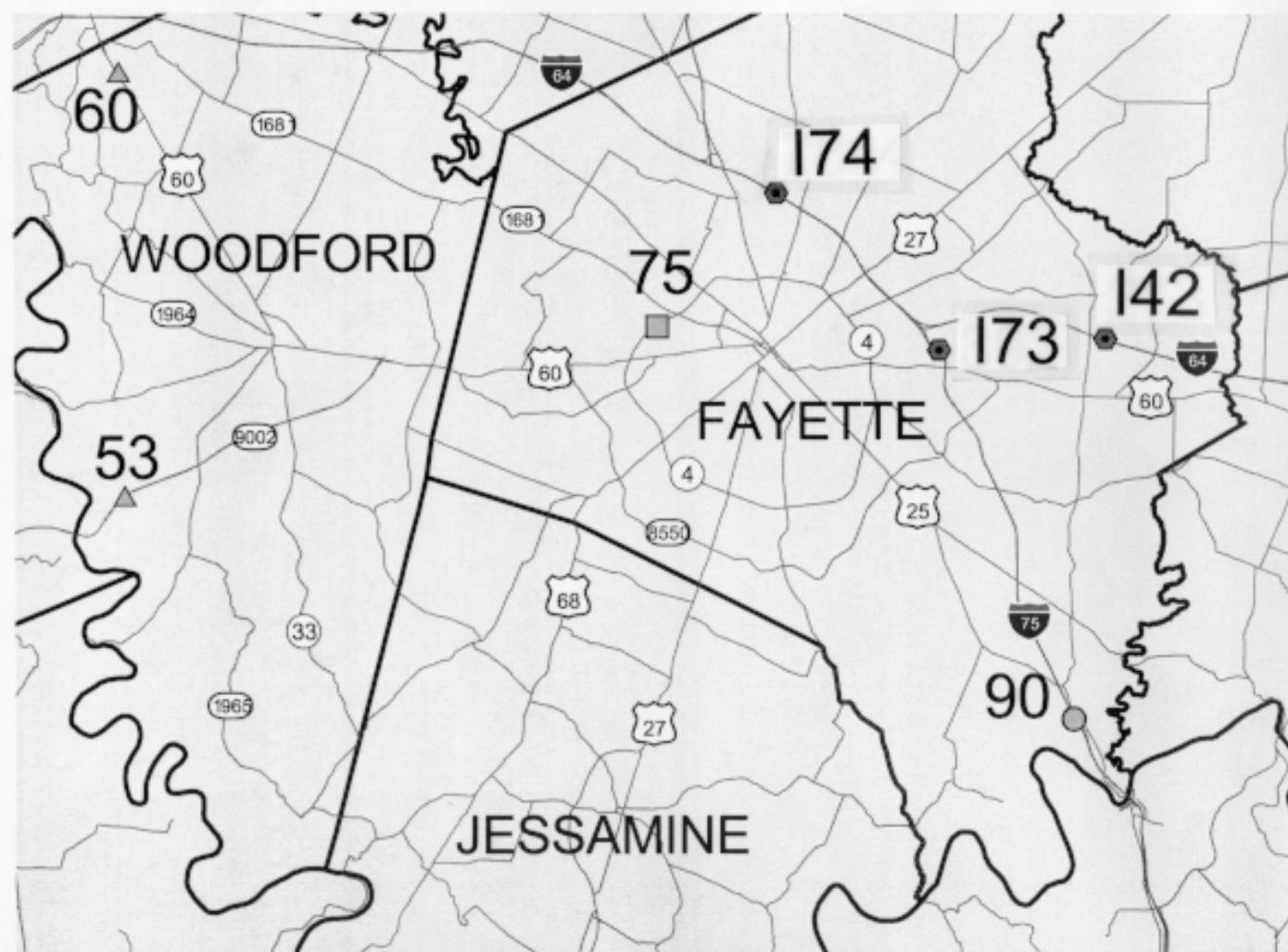
Interstate ## #

# EXHIBIT 1C

## WOODFORD & FAYETTE COUNTY 2002 ATR & IS LOCATIONS

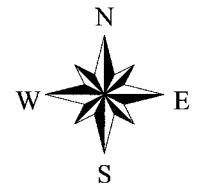
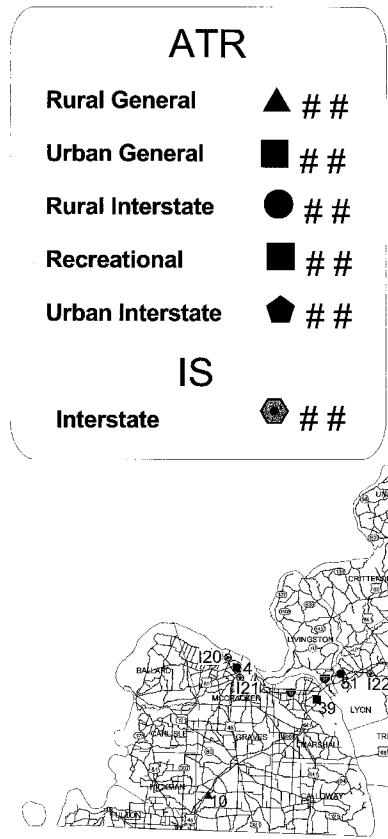


ATR LOCATIONS	
Rural General	△ # #
Urban General	■ # #
Rural Interstate	● # #
IS LOCATIONS	
Interstate	◆ # # #



# Exhibit 1D

## KENTUCKY AUTOMATIC TRAFFIC RECORDER & INDEX STATION LOCATIONS 2002



Detail Map

# Exhibit 2

## Kentucky Counties

### 2000 - 2030 Growth Rates

